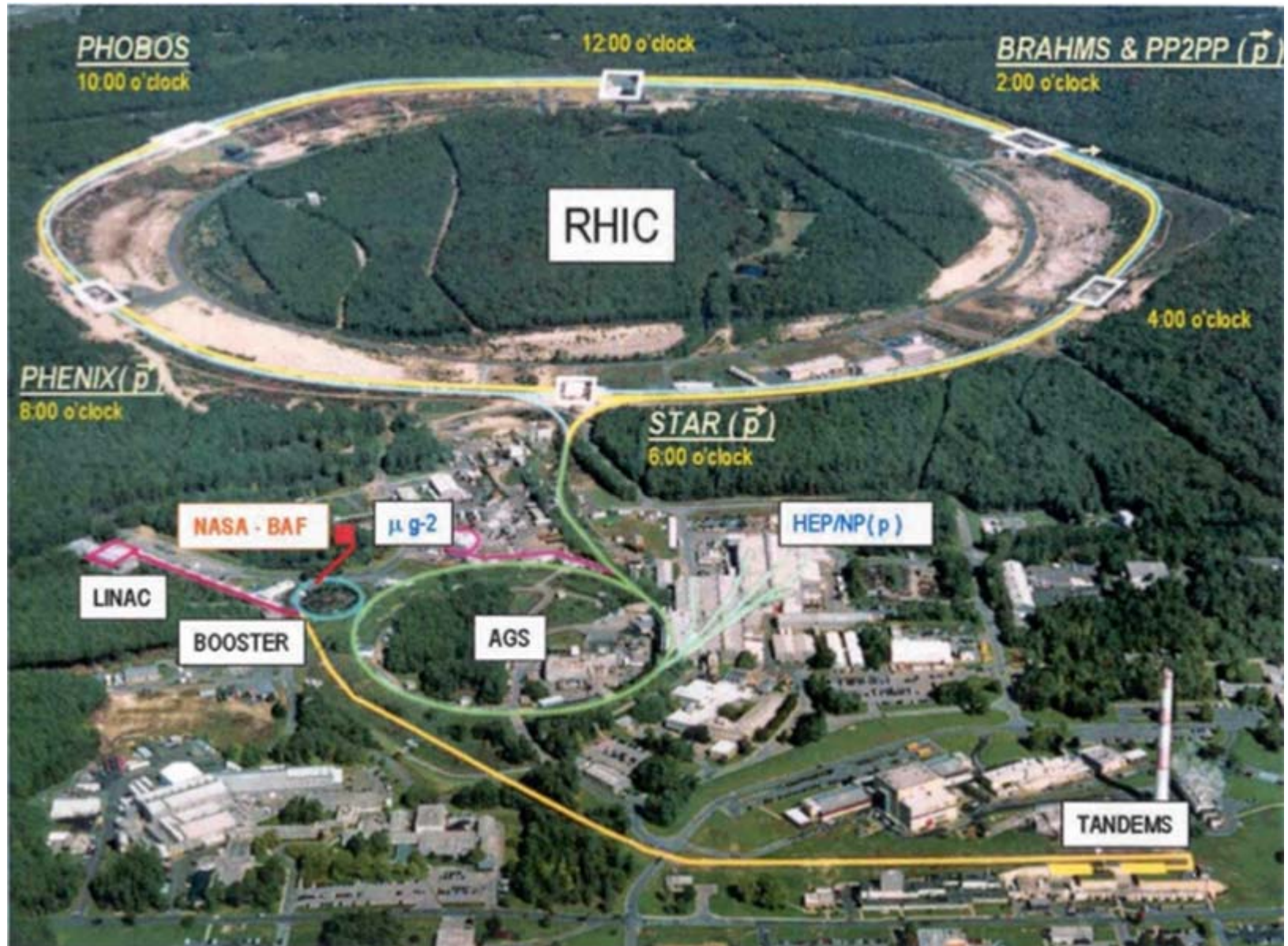


# Collider-Accelerator Department (C-AD)

## Collider User Training



# Learning Objectives or Why Take This Course?

- Access into Collider experimental areas
- Conventional & Radiological Safety Hazards
- Response to emergencies
- Equivalency for:
  - **General Employee Radiological Training (GERT), and**
  - **Oxygen Deficiency Hazard (ODH) Training** ([for ODH Class “0” Areas at RHIC only](#))

# C-AD Conduct of Operations

Written agreement with DOE

- Written procedures exist for most operations
- Use of qualified and trained personnel
- Appropriate authorizations and work permits
- Definitive lines of authority
  - On-duty Operations Coordinator (x4662) is responsible for the safe operation of accelerator complex during operating periods
  - Maintenance Coordinator is responsible for safe operation and coordination during shut down periods

# Liaison Physicists

Primary contact for safety issues related to the experiment

<http://server.ag.s.bnl.gov/bnlags/liaisons.html>

STAR	Wuzheng Meng	2120
PHENIX	Yousef Makdisi	4932

# GERT

## General Employee Radiological Training

- **Allows access into CONTROLLED AREAS**

**Note: AT C-AD, GERT qualification does not allow access into Controlled Areas that require a TLD**

### **Maximum Expected Annual Exposure:**

Individuals trained to the GERT level who are not issued personal dosimetry (e.g.: TLD\*) are not expected to receive in excess of **100 mrem/year**.

- **Also, less than 5 mrem/hr in Controlled Areas.**

\* TLD: Thermo-luminescent Dosimeter

# ALARA Philosophy

Radiation exposure must :

- Have A Net Benefit
- Be AS LOW AS REASONABLY ACHIEVABLE
- Be Within Limits

Basic ALARA strategy on the part of the worker (or User) revolves around effective use of Time, Distance and Shielding.

Also, ALARA should be incorporated into design, as well as operations.

# Areas controlled for radiation protection

## Radiological Areas

**Controlled Area -- any area where access is controlled due to the presence of radiation above natural background levels or due to the presence of man-made radioactive materials. As a minimum, these areas are posted “Controlled Area.”**

**Radiation Area -- any accessible area where an individual may receive a whole-body dose greater than 5 mrem in one hour at 30 cm (1 ft). As a minimum, these areas are posted “Radiation Area, TLD Badge Required.”**

**High Radiation Area -- any accessible area where an individual may receive a whole-body dose greater than 100 mrem in one hour at 30 cm (1 ft). As a minimum, these areas are posted “Danger, High Radiation Area, TLD Badge and SRD Required.”**

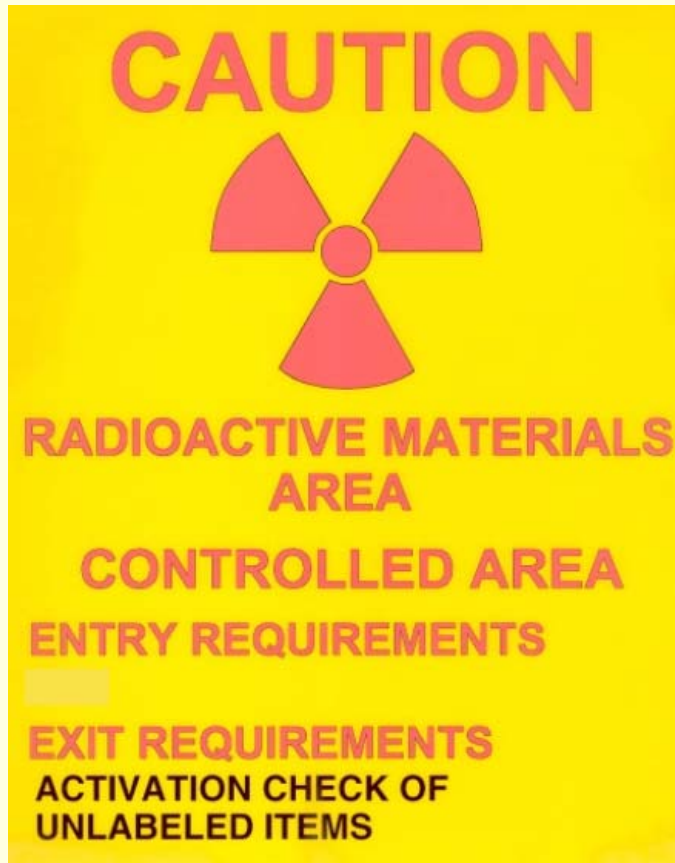


# RHIC Inner Ring Road





# Activation Check Radioactive Materials Area



This posting means you must not release items from the area without checking for activation. A Radiological Control Technician (RCT) performs these checks.

Contact the C-AD Health Physics (HP) office (x4660) to perform activation check.

# RHIC Tunnel

(Pay attention to postings)

This posting means:

- a **“TLD”** is required for entry
- **“Activation Check”** is required of items being removed

Also, if entering the tunnel, bring a flashlight with you



TLD: Thermo-luminescent Dosimeter

# **Primary areas are considered lethal with beam on**

Example: **PRIMARY BEAM:**

100,000,000 rem/hr

for Gold ion beam

However, in RHIC experimental areas occupied by personnel/Users:

During Normal Beam Operations

**CONTROLLED AREA**

< 5 mrem / hour

< 100 mrem / year

# Sealed Radiation Sources

Contact the C-AD Sealed Source Custodian.

Have sources inventoried and leak-checked by C-AD Health Physics.

Complete the source inventory form. Keep the form with the source.



**DO NOT LOITER AROUND SOURCE STORAGE BOXES**

# Price-Anderson Amendments Act (PAAA)

Failure to comply with radiological rules or other safety rules, or failure to identify and report non-compliances to the Department of Energy (DOE), subjects the Laboratory to enforcement action.

Worker/User responsibilities include:

- Comply with requirements
- Report non-compliances
- Obey Stop Work Orders

## **WARNING**

Willful or flagrant disregard of Federal Radiation Protection Rules or other Safety Rules may results in disciplinary action.

# Radiation Barriers

When are you permitted to defeat radiation barriers?

**NEVER**

Even if you believe the barrier is not needed, do not take it upon yourself to defeat the barrier. Contact the C-AD Health Physics Office to have the barrier evaluated.



# Deliveries at C-AD

## On-site

All persons (including delivery people) who enter Controlled Areas must either:

- be escorted by a trained radiation worker, or they must
- be a trained radiation worker.

General Employee Radiological Training (GERT) is required as a minimum for “Controlled Areas”.

To ensure unauthorized delivery people do not wander into Controlled Areas when making deliveries on site, all deliveries are to be made to non-posted areas.

Deliveries should be made to **Building 100** during normal business hours.

Deliveries for off hours can be made to the C-AD Main Control Room (x4662), however prior arrangement with MCR is required.

## Off-site

To ship material off the BNL site (other than printed documentation) material must go through one of the Laboratory's special shipping divisions. Contact your Liaison Physicist or Liaison Engineer for assistance.

# Particle Accelerator Safety System (PASS)

**ACCESS PROHIBITED**



**CONTROLLED ACCESS**



**RESTRICTED ACCESS**

# Purpose of the Particle Accelerator Safety System (PASS)

PASS is designed to:

1) Provide Radiation Protection

and

2) Provide Oxygen Deficiency Hazard (ODH) Warning

- Card key used during Restricted Access Mode
- Key from key tree used during Controlled Access Mode
- One Key, One Person, One Access !

(more than one person may enter with “one opening of the door”

IF RULES ARE FOLLOWED)

# Control Panels



# Intersection Region (IR) Entry Procedure

## During Restricted Access Mode

Use Particle Accelerator Safety System (PASS) Card Key

### During RESTRICTED ACCESS Mode:

To enter, place PASS access card key on card reader, get small green light on reader, then open door.

To exit, turn knob to open door (card key not required to exit).



# Intersection Region (IR) Entry Procedure During Controlled Access Mode

Iris Reader

Key Tree

Iris Reader

Key Tree



New at STAR



# Intersection Region (IR) Entry Procedure During Controlled Access Mode

Key with RFID tag



Edge Reader

Indicator light



Present the RFID tag within 1 ½ inches of the Edge Reader until the indicator light on the top of the Edge Reader is illuminated Green.

# Access Control Modes - Summary

## **Green Light - RESTRICTED ACCESS**

To enter: Place card key on reader, get green light on reader, open door

To exit: Turn knob on door

## **Yellow Light - CONTROLLED ACCESS**

Confirm with Shift Leader that access is allowed to the Experiment.

Main Control Room (MCR) controls & monitors access.

Get Key from Key Tree.

To enter: Call MCR; be observed by video

***TAKE KEY WITH YOU!***

To exit: Call MCR; be observed by video

## **Red Light - ACCESS PROHIBITED**

This mode means that beam is on or is about to be turned on.

Access is PROHIBITED

# CRASH CORDS



Note: When entering tunnels, bring a flashlight

# Examples of Crash Cord in Intersection Region (IR)



# Electrical Safety

This Collider User Training does not alone qualify you to work on or near electrical equipment or circuits that are connected, e.g. powered through circuit breakers, disconnect switches and/or fuses. Additional training and authorization is required.

Personal protective equipment (PPE) may also be required as well as a special work permit (Energized Electrical Work Permit).

Additional training and authorization is even required for operation of circuit breakers or disconnect switches, and PPE is also required, even for relatively low voltage such as a 120 Volt breaker.

The training and PPE requirements at the Collider-Accelerator Department, which includes RHIC, may be different and more conservative than the Laboratory-wide requirements.

Some contacts if you have questions regarding the electrical safety requirements for your specific situation are:

- The C-AD ESH Coordinator
- Your experiment Work Coordinator
- Your experiment Shift Leader
- Your experiment Liaison Physicist
- The C-AD Work Control Manager

You may also refer to the C-A Department Operations Procedures Manual (OPM) for C-AD training and PPE requirements.

# LOTO

## (Lockout/Tagout)

If you work on electrical circuits that are powered through circuit breakers, disconnect switches and/or fuses, then you must LOTO (Lockout/Tagout) the circuits.

All workers performing LOTO must have the appropriate BNL training and C-AD authorization.





DATE \_\_\_\_\_ TAG NO. 66731  
APPARATUS \_\_\_\_\_ TIME \_\_\_\_\_

**HOLD  
DANGER**

WRITE REASON IN SPACE BELOW

DO NOT USE, MOVE OR OPERATE  
WHILE THIS TAG IS ATTACHED

TAG ATTACHED BY  
AND MAY BE REMOVED ONLY BY

\_\_\_\_\_  
PRINT NAME

\_\_\_\_\_  
DEPT.

\_\_\_\_\_  
EXTENSION

RETURN TAG TO ISSUING  
OFFICE WHEN NO LONGER REQUIRED

TAG NO. 66731 DATE \_\_\_\_\_  
HAS BEEN ATTACHED TO \_\_\_\_\_

BECAUSE \_\_\_\_\_

SIGNED \_\_\_\_\_

RETURN STUB TO ISSUING OFFICE

BNL F 2791A

# LOTO

**USED FOR  
PERSONNEL  
PROTECTION**

**Only the person who applied a LOTO  
(or a special committee of 3)  
may remove that LOTO**

# NEW Electrical Safety Requirement (NFPA 70E)

NFPA: National Fire Protection Association  
70E: Electrical Safety in the Work Place

Newest Concern: ***Electrical Arc Flash Hazards***

(in addition to the already existing concern of electrocution)

In U.S., 8 to 10 people per day are sent to burn unit due to arc flash, mostly from low voltage (120 V)

Biggest Impact to Users: Additional training & PPE required during breaker or switch gear operation

- Working on or near live equipment is not permitted without the proper training & PPE
- This may slow jobs down, but we must comply with NFPA 70E

# Yellow Tags

USED FOR

EQUIPMENT or PROGRAMMATIC

PROTECTION

A yellow rectangular tag with a hole punch at the top. It contains the following text and fields:

TAG NO. 1785 DATE \_\_\_\_\_

APPARATUS \_\_\_\_\_

**DO NOT  
OPERATE**

THIS DEVICE SHALL NOT BE OPERATED BY ANY ONE  
OTHER THAN THOSE DESIGNATED BY:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(SUPERVISORS OR FOREMEN)

UNAUTHORIZED OPERATORS ARE  
SUBJECT TO DISCIPLINARY ACTION

(OVER)

A yellow rectangular tag with a hole punch at the top. It contains the following text and fields:

**CAUTION**

DO NOT OPERATE

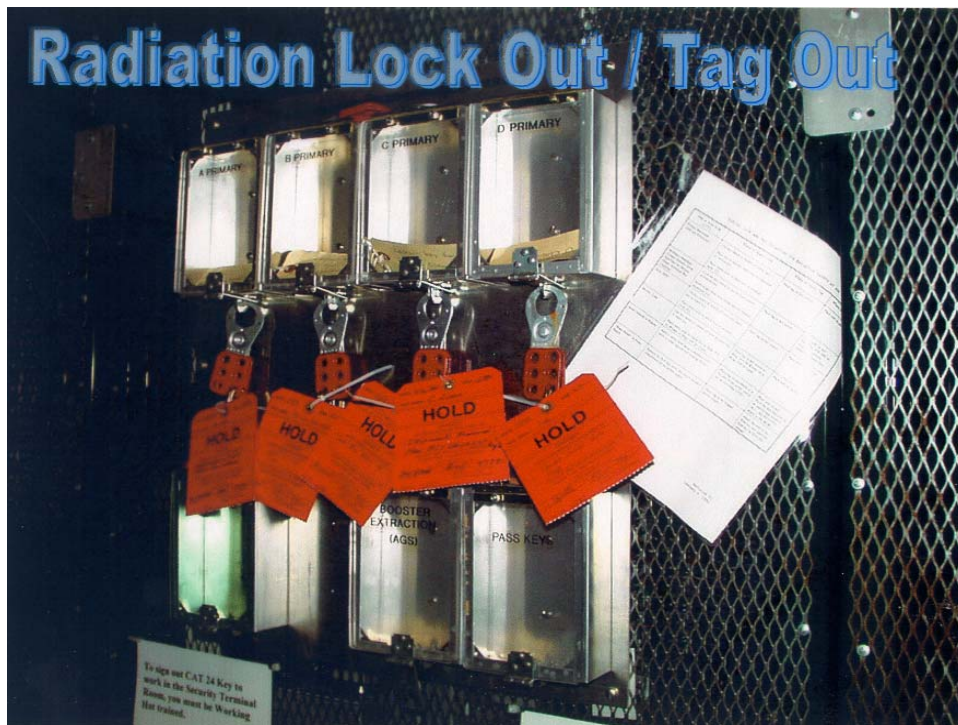
PROGRAMMATICAL LOSS  
OR  
EQUIPMENT DAMAGE  
POSSIBLE

SEE OTHER SIDE.

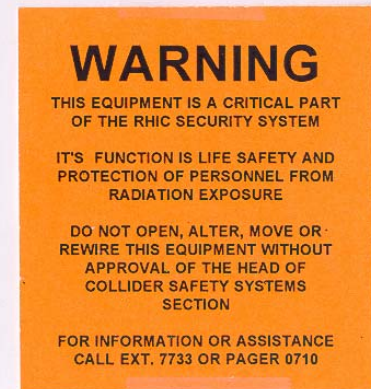
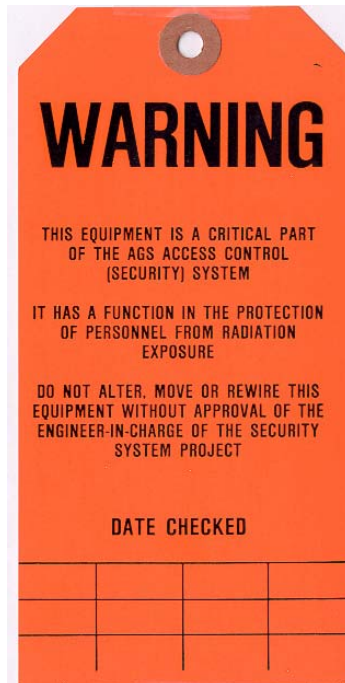
STONEHOUSE SIGNS, Inc., Denver, CO  
TAG NO. 2587-G

# Radiation Safety (RS) LOTO & Orange Tags

## Red Tags Radiation Safety LOTO



## Orange Tags PASS System Equipment



**Do not touch equipment. Contact the MCR.**



## “ CHIPMUNKS ” AREA RADIATION MONITORS



- SET UP LIKE STOP LIGHTS (red, yellow, green)
- RED BLINKING LIGHT FOR GREATER THAN 20mrem/hr
- YELLOW BLINKING FOR GREATER THAN 2 mrem/hr
- DATA IS STORED AND CAN BE USED TO ESTIMATE DOSE
- INTERLOCKS AT HIGH DOSE

# MAGNETIC FIELDS

**CAUTION**

**MAGNETIC FIELD HAZARD**

*FIELDS > 0.5 mT (5 G)*

- MEDICAL EVALUATION AND TRAINING FOR USERS OF:
  - \* CARDIAC PACEMAKER
  - \* ELECTRONIC MEDICAL IMPLANTS
- SEE ES&H COORDINATOR FOR DETAILS



A photograph of the STAR magnet assembly, a large, complex, blue, cylindrical structure with a central opening. It is surrounded by a dense network of red and orange cables and is supported by a blue metal frame with yellow safety railings. The assembly is located in a large industrial or laboratory setting with a high ceiling and concrete floor. The text "STAR Magnet" is overlaid in green at the top center.

STAR Magnet

STAR Magnetic Field

500 Gauss Field



# Confined Space Recognition

**A confined space is a space that:** (even if not posted “Confined Space”)

1. Is large enough and so configured that personnel can bodily enter and perform assigned work;
2. Has limited or restricted means for entry or exit (e.g., tanks, vessels, silos, storage bins, hoppers, vaults, and pits); and
3. Is not designed for continuous personnel occupancy.

**IF** you are entering a space with these characteristics and:

- you are not sure of the regulatory or safety requirements for entry,
- you are not sure of the requirements for working within the space, or
- you are introducing any hazard

**THEN** contact the C-AD ES&H Coordinator prior to entry

# **Additional Training is Required to Work on Specialized Systems**

## **STAR Cooling Systems**



**Working at heights above 4 feet**

## **Gas Storage**



## **Power Supply / Equipment Room at STAR**



# Some Hazards

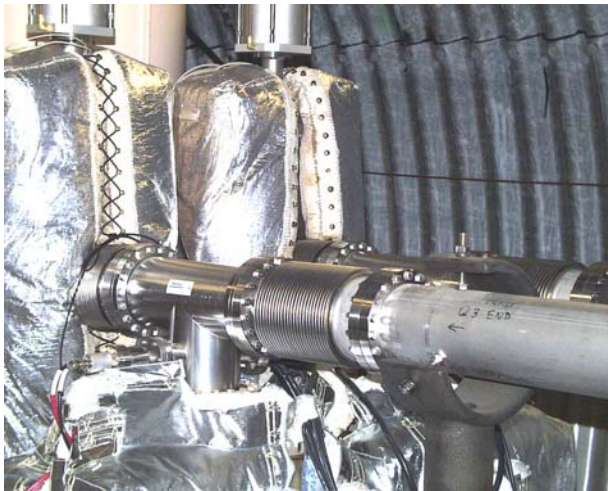
TRIP HAZARDS AT STAR



LASERS



BEAM PIPES



PIPING ELECTRICAL, WATER, CRYOGENIC



# Laser Safety

Lasers must be registered with the BNL Laser Safety Officer:

Includes higher hazard class lasers (Classes IIIb and IV) as well as lower hazard class lasers (Classes II and IIIa).

Classes IIIb and IV require:

- Additional Laboratory training
- Completion of a Laboratory Standard Operating Procedure (SOP).

Classes II and IIIa require a permit.

**Contact:** C-AD Laser Coordinator: Asher Etkin (x4006)

# Hardhat Policy



**Required at construction areas**

**Required when people are working overhead**

**Required when overhead cranes are handling objects overhead**



# Hearing Protection



If entering a posted high noise area, as a minimum you are required to:

- wear hearing protection

**AND**

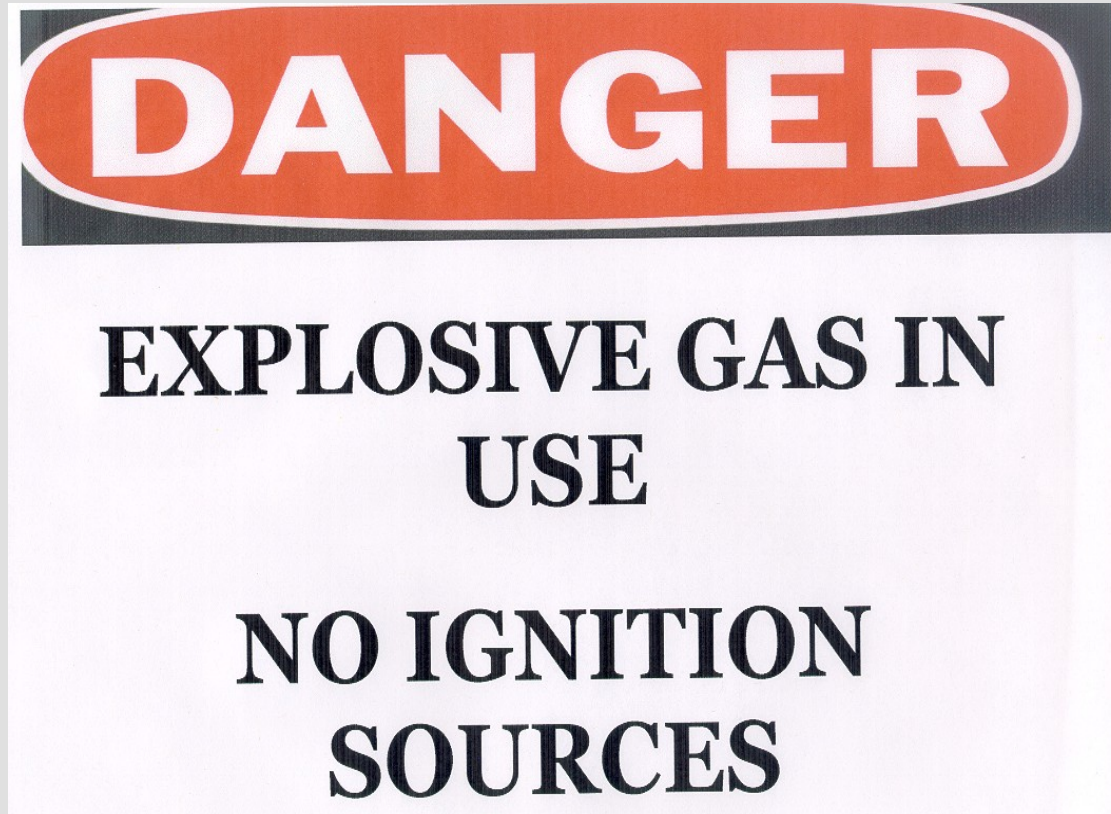
- complete a BNL web-based training course before entry (tells you how to properly insert ear plugs)

Medical surveillance (hearing test) may also be required depending on the decibel levels and length of time in areas.

Disposable ear plugs are located at the entrances to high noise areas.

# Explosive Gas

For example: at STAR and PHENIX



YELLOW strobe and audible alarm



# Work Planning and Hazard Screening

All work C-A must be planned and screened for Environment, Safety, Security & Health (ESSH) hazards.

The hazards for C-A work planners who are involved in screening are as follows:

**Low-Hazard Work (also known as “Worker-Planned-Work”)**: Work requiring the attention of the average performer to prevent minor injury. Failure to correctly perform low-hazard work would not damage equipment or structures or release potentially hazardous materials to the environment, except as a result of gross negligence.

As a minimum, for “**Low-Hazard**” activities, you are required to read & sign a work plan document specific to your experiment. Information about the work plan document may be obtained from your Experiment Spokesperson or from the Collider-Accelerator Department (C-AD) Liaison Physicist for your experiment. The document and the reading & "signing" is typically available on-line.

## Green Work Permits For Moderate/High Hazard Work (Known as “Enhanced Work Planning”)

**Moderate-Hazard Work:** Work requiring coordinated actions to prevent any injury to personnel, minor damage to equipment or structures, or release of hazardous materials to the on-site environment.

**High-Hazard Work:** Work requiring coordinated actions to prevent serious injury to personnel, significant damage to equipment or structures, or releases of reportable quantities of potentially hazardous materials to the off-site environment.

**BROOKHAVEN**  
NATIONAL LABORATORY

**Work Permit #** \_\_\_\_\_

Work Order # \_\_\_\_\_

Job # \_\_\_\_\_ Activity # \_\_\_\_\_

**I. Work requester fills out this section.**

☐ **Standing Work Permit**

Requester \_\_\_\_\_ Date: \_\_\_\_\_ Ext. \_\_\_\_\_ Dept/Div/Group: \_\_\_\_\_  
 Other Contact person (if different from requester): \_\_\_\_\_ Ext. \_\_\_\_\_  
 Work Control Coordinator \_\_\_\_\_ Start Date \_\_\_\_\_ Est. End Date \_\_\_\_\_  
 Brief Description of Work: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 Building \_\_\_\_\_ Room \_\_\_\_\_ Equipment \_\_\_\_\_ Service Provider \_\_\_\_\_

**2. WCC, Requester/Designee, Service Provider, and ES&H (as necessary) fill out this section or attach analysis.**

**ES&H ANALYSIS**

**Radiation Concerns** ☐ None ☐ Activation ☐ Airborne ☐ Contamination ☐ Radiation ☐ Other \_\_\_\_\_  
☐ Special nuclear materials involved, notify Isotope Special Materials Group ☐ Fissionable materials involved, notify Laboratory Criticality Officer

**Safety Concerns** ☐ None ☐ Ergonomics ☐ Transport of Haz/Rad Material ☐ Lead\* ☐ Penetrating Fire Walls  
☐ Adding/Removing ☐ Confined Space\* ☐ Explosives ☐ Flammable ☐ Magnetic Field\* ☐ Pressurized Systems  
☐ Walls or Roofs ☐ Corrosive ☐ Fumes/Mist/Dust\* ☐ Material Handling ☐ Flaming/Critical Lift  
☐ Asbestos\* ☐ Cryogenic ☐ Heat/Cold Stress ☐ Noise\* ☐ Toxic Materials\*  
☐ Beryllium\* ☐ Elevated Work\* ☐ Hydraulic ☐ Non-ionizing Radiation\* ☐ Vacuum  
☐ Biohazard\* ☐ Excavation ☐ Lasers\* ☐ Oxygen Deficiency\* ☐ Other \_\_\_\_\_  
☐ Chemicals\* ☐ Excavation ☐ Lasers\* ☐ Oxygen Deficiency\* ☐ Other \_\_\_\_\_

\*Does this work require medical clearance or surveillance from the Occupational Medicine Clinic? ☐ Yes ☐ No

**Environmental Concerns** ☐ None ☐ Work impacts Environmental Permit No. \_\_\_\_\_  
☐ Atmospheric Discharges (rad/non-rad) ☐ Land Use ☐ Soil activation/contamination ☐ Waste-Mixed  
☐ Chemical or Rad Material Storage or Use ☐ Liquid Discharges ☐ Waste-Clean ☐ Waste-Radioactive  
☐ Cesspools (UIC) ☐ Oil/PCB Management ☐ Waste-Hazardous ☐ Waste-Regulated Medical  
☐ High water/power consumption ☐ Spill potential ☐ Waste-Industrial ☐ Underground Duct/Piping  
 Waste disposition by: \_\_\_\_\_ ☐ Other \_\_\_\_\_

**Pollution Prevention (P2) / Waste Minimization Opportunity:** ☐ None ☐ Yes

**FACILITY CONCERNS** ☐ None ☐ Potential to Cause a False Alarm ☐ Vibrations  
☐ Access/Egress ☐ Electrical Noise ☐ Temperature Change ☐ Other \_\_\_\_\_  
☐ Limitations ☐ Impacts Facility Use Agreement ☐ Utility Interruptions  
☐ Configuration Control ☐ Maintenance Work on Ventilation Systems

**WORK CONTROLS**

**Work Practices**  
☐ None ☐ Exhaust Ventilation ☐ Lockout/Tagout ☐ Spill Containment ☐ Security (See Insurance Sheet)  
☐ Back-up Person/Watch ☐ HP Coverage ☐ Posting/Warning Signs ☐ Time Limitation ☐ Other \_\_\_\_\_  
☐ Barricades ☐ IH Survey ☐ Scaffolding-requires inspection ☐ Warning Alarm (i.e. "High level")

**Protective Equipment**  
☐ None ☐ Ear Plugs ☐ Gloves ☐ Lab Coat ☐ Safety Glasses  
☐ Coveralls ☐ Ear Muffs ☐ Goggles ☐ Respirator ☐ Safety Harness  
☐ Disposable Clothing ☐ Face Shield ☐ Hard Hat ☐ Shoe Covers ☐ Safety Shoes ☐ Other \_\_\_\_\_

**Permits Required** Permits must be valid when job is scheduled.

☐ None ☐ Cutting/Welding ☐ Impair Fire Protection Systems  
☐ Concrete/Masonry Penetration ☐ Digging/Core Drilling ☐ Rad Work Permit-RWP No. \_\_\_\_\_  
☐ Confined Space Entry ☐ Electrical Working Hot ☐ Other \_\_\_\_\_

**Dosimetry/Monitoring**

☐ None ☐ Heat Stress Monitor ☐ Real Time Monitor ☐ TLD  
☐ Air Effluent ☐ Noise Survey/Dosimeter ☐ Self-reading Pencil Dosimeter ☐ Waste Characterization  
☐ Ground Water ☐ O<sub>2</sub>/Combustible Gas ☐ Self-reading Digital Dosimeter ☐ Other \_\_\_\_\_  
☐ Liquid Effluent ☐ Passive Vapor Monitor ☐ Sorbent Tube/Filter Pump

**Training Requirements** (List below specific training requirements)

Based on analysis above, the Workdown Team determines the risk, complexity, and coordination ratings below.

**ES&H Risk Level:** Low ☐ Moderate ☐ High  
**Complexity Level:** Low ☐ Moderate ☐ High  
**Work Coordination:** Low ☐ Moderate ☐ High

If using the permit when all hazard ratings are low only the following need to sign (although allowed, there is no need to use back of form)

\_\_\_\_\_  
 WCC DATE  
 \_\_\_\_\_  
 Service Provider DATE  
 Authorization to start \_\_\_\_\_  
 Departmental Sup/WCC-Designee DATE

BNL F 3093C - rev. 9/03

# Oxygen Deficiency Hazard Signs

**CAUTION**

**OXYGEN  
DEFICIENCY  
HAZARD**

**0**

**Prior to entry, all personnel shall have:**

- Oxygen deficiency hazard orientation**

# What Is Oxygen Deficiency?

Normal atmospheric content is:

20.9% oxygen, 78% nitrogen, 1% argon

Oxygen deficiency is defined as  $< 19.5\%$  oxygen

This happens when air in an enclosed space is displaced by another gas (examples are helium and nitrogen)

# What Causes Oxygen Deficiency?

- Cryogenic systems at RHIC use large amounts of helium fluid.
- The helium expands about 700-800 times when released in air.
- This could happen quickly with a major release as a result of a catastrophic failure. A rapidly expanding, white cloud and possible “whooshing” sound.
- Could be slow, invisible and silent leak.
- The gas is colorless and odorless.

# Classification of ODH Levels

- There are five classes: 0 through 4, with 0 being the least hazardous.
- Classification is based on the likelihood of fatality.
- This training only allows access into CLASS 0 areas.
- Additional training and control measures are required for Class 1 areas.

## **Class 0 ODH Areas at the Collider complex**

- Buildings at RHIC with Valve Boxes
  - Support Buildings 1002B, 1004B, 1006B, 1008B
  - Service Buildings 1010A and 1012A
  - Helium Compressor buildings 1005H and 1005E
- Collider Tunnel, PHOBOS area (10 o'clock position), BRAHMS and PP2PP area (2 o'clock position)

## **Class 1 ODH Area at the Collider complex**

- There is one area at the Collider with **ODH 1** classification:  
Building 1005R (refrigerator building)



## Volume Oxygen (%)

## Effect on Healthy Person (at Rest at Sea Level)

17	Increased breathing volume Accelerated heartbeat Night vision reduced
16	Dizziness Slower reaction time
15	Impaired attention Impaired judgment Impaired coordination Intermittent Breathing Rapid Fatigue Loss of muscle control
12	Very Faulty judgment Very poor muscular coordination (Inability to move) Loss of consciousness Permanent brain damage
10	Inability to move Nausea Vomiting
6	Spasmodic breathing Convulsive movements Death in 5 to 8 minutes

## *Effects of Oxygen Deficiency*

Effects may occur rapidly

# When Is Evacuation Required?

- When the in-place oxygen monitors set off an alarm.

At the COLLIDER: Blue Strobe Light & Audible Alarm



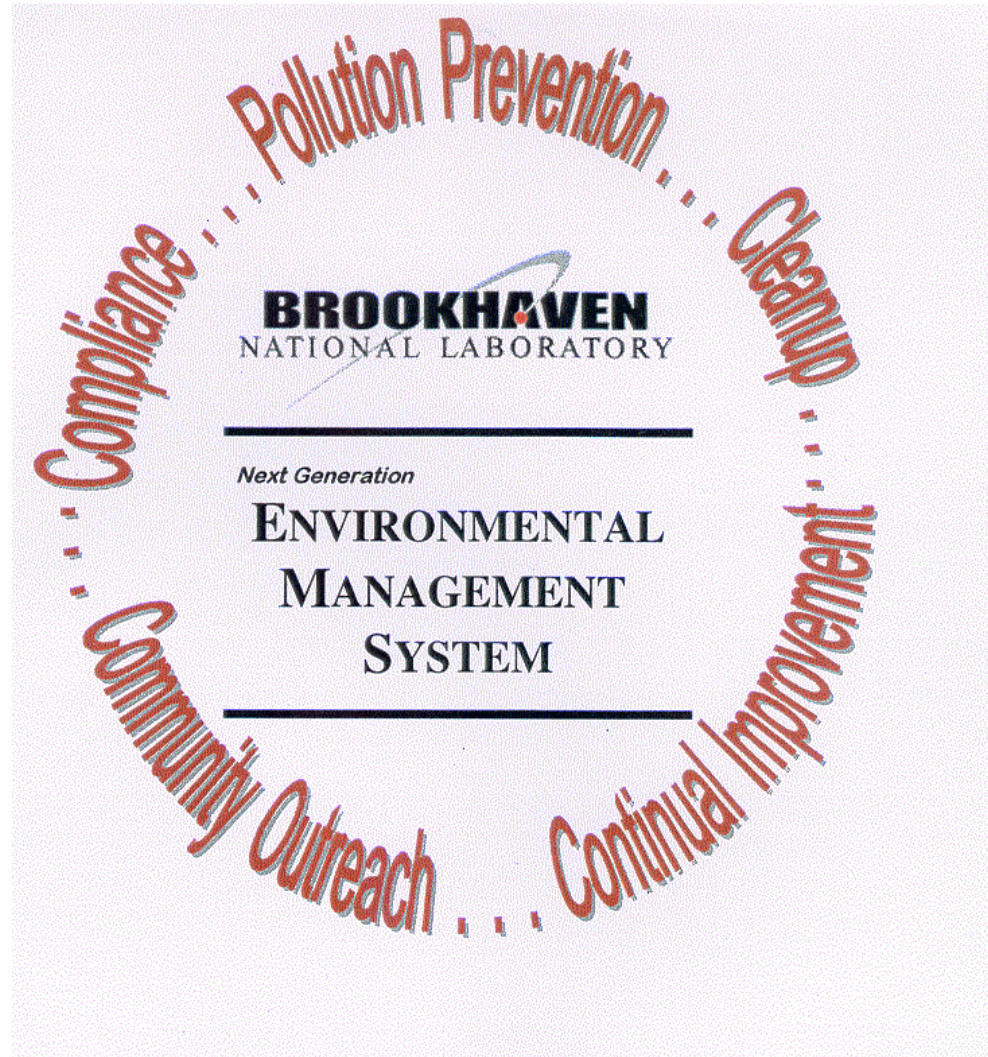
## OR:

- A Vapor cloud is observed or a loud whooshing sound is heard inside the ODH area (even if no alarm sounds).

# Evacuation Procedure

- Leave the area immediately, moving away from any vapor cloud (lethal freezing hazard) or any noise.
- Stay Low!
  - Duck under magnets to get to exits
  - Do not use overpasses to cross the beamlines
  - Do not use vertical (ladder) exits
  - Use only horizontal exits
- After exiting, call 2222 or 911 if anyone is injured or trapped.
- DO NOT ATTEMPT A RESCUE as you are likely to be the next victim! Let the pros handle it.

# Pollution Prevention at C-A



# Waste Disposal

Improper disposal of radioactive waste or hazardous waste may result in fines, criminal prosecution, and facility shutdown.

- Contact the C-AD Environmental Coordinator (x7520) for information on any waste.
- Contact the C-AD Environmental Compliance Representative (ECR x2905) prior to establishing any airborne, liquid, or solid radioactive or hazardous waste stream.

Any questions regarding waste disposal or generation, **contact your Liaison Physicist.**

# Spill Reporting

- The C-A Department is required to report spills; internally, externally, or BOTH.
- C-AD must report *quickly* to external agencies on spills that impact the environment.
- Even minor events, such as spilling any amount of oil in an outdoor area, require reporting.
- If you spill any hazardous or industrial material outdoors on the ground, or anywhere inside and the spill is beyond your control, call x2222 or 911 to report the spill. Then call:  
  
C-AD Main Control Room (x4662), the C-AD ESHQ Division Head (x5272) or the C-AD Environmental Coordinator (x7520).
- *For any spill, notify your Experiment Spokesperson and/or your Liaison Physicist.*
- Do not leave a message on an answering machine as notification.
- When reporting, give your name and information on the spill location, type of material and approximate amount.

# Material Safety Data Sheets - MSDS

- Name of Chemical
- Manufacturer
- Hazardous Ingredients
- Physical Characteristics
- Fire and Explosion Data
- Reactivity Data
- Health Hazard Data
- Safe Handling Data
- Safety Control Measures

Available from the C-AD ES&H Coordinator



# Compressed Gas Cylinder Handling

## General Rules

**Note:** Additional training required (web-based course)

- Do not drop cylinders or permit them to violently strike each other
- Do not roll cylinders in a horizontal position
- Do not drag cylinders
- Do not handle cylinders with oily hands or gloves (This is especially important when handling oxygen and other oxidizers)
- If hoisting is necessary, use a suitable cradle or platform
- Do not lift cylinder by its cap
- Keep cylinder caps on the cylinder whenever they are not in use
- Transport cylinders using a cart or hand truck designed for that purpose

# ASSEMBLY AREA POSTING

## EMERGENCY INFORMATION

YOU ARE IN BUILDING # 911

EVACUATION ZONE # 8

IN THE EVENT THE BUILDING ALARM SOUNDS - PROCEED TO  
OUTDOOR ASSEMBLY AREA East Parking Lot

IN THE EVENT THE STEADY SITE SIRENS SOUNDS - PROCEED TO  
INDOOR ASSEMBLY AREA Main Lobby / Snyder Seminar  
room.

SHELTER-IN-PLACE AREA Snyder Seminar Room.

LOCAL EMERGENCY COORDINATOR

A. Piper

EXTENSION 7934

# Emergency (Injury / Illness)

If there is an emergency such as an illness or injury, pull the fire alarm pull-box (if one is in the area) and call 911 or 2222.

From a cell phone: 344-2222 (area code is 631)

Please note the following lesson learned from an arc flash injury at STAR. This is not intended to imply any fault with the C-AD staff who participated in the emergency and acted as best as they saw fit at the time.



Unless an injury is very minor:

**Never** transport the injured person to the Clinic yourself; wait for the Fire Department to arrive with the EMT and ambulance. Make sure you pull the Fire Alarm box (if one is in the area) to immediately let Fire/Rescue know the location of the problem. Still follow up immediately with a call to 2222 or 911 (on a cell phone: 344-2222) to let F/R know it is an injury so the EMT/ambulance are dispatched to the scene (they usually don't send the ambulance for a fire only).

If you transport the person yourself, time may be wasted in having the ambulance track you down. In addition, you may be stuck with an injured person who passes out or stops breathing, etc., on the way to the Clinic or you could be nervous and have an accident on the way to the Clinic.

For a minor non-emergency injury, report as soon as possible to the BNL Occupational Medicine Clinic (OMC), located in building 490.

## Alcohol/substance Abuse:

Employees or Guests of the Laboratory who abuse alcohol and/or controlled substances pose unacceptable risks to the safe and efficient operation of the Laboratory. In addition to jeopardizing employee safety and/or impacting on performance, conduct and reliability, substance abuse is illegal.

# Summary of Alarm Signals

## Orange Strobe and Audible Alarm

**Beam Immanent** — — — — — → Pull crash cord or exit  
through access gate,  
contact MCR

## Blue Strobe and Audible Alarm

**Oxygen Deficiency Hazard (ODH)** — → Exit the area through horizontal exit, stay low

## Yellow Strobe and Audible Alarm

**Flammable or Explosive Gas** — — → Exit the area, report to outdoor assembly area.

## Continuous or Intermittent Bells

**Fire** ————— → Exit the area, report to outdoor assembly area.

**DO NOT RENTER buildings. Wait for further instructions from Fire Captain or ES&H Coordinator.**



# C-AD Escort Policy

## **CONTACT C-AD ESHQ Division:**

John Maraviglia (x7343)

or

Ray Karol (x5272)

or

Asher Etkin (x4006)



# Note Your Surroundings

- Exits
- Fire Alarm Pull Boxes
- Intercoms / Telephones
- TLD Requirements
- Conventional Safety Hazards/Postings
- Radiological Safety Hazards/Postings
- Safety Equipment
- Emergency exhaust
- Assembly Areas

# Staffing Levels and Safety

- Rules shall be followed even when you are short-handed.
- Do not violate Safety Rules to get the job done.
- Do not use a procedure that you have not been trained on even if you feel it will please your supervisor.

